Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently amended) An electric motor monitoring system comprising an antenna~~, a data sampling means~~ and a ~~data processing~~ processor; ~~means characterised in that~~ the antenna ~~provides means for~~ detecting ~~a~~ radio-frequency signals generated by arcing events ~~from a brush contact of~~ in the electric motor~~,~~; and ~~provides a diagnostic for monitoring the operation of both mechanical and electrical components~~ the processor processing the radio-frequency signals to determine one or more operational parameters of the electric motor.

2. (Previously presented) An electric motor monitoring system as claimed in Claim 1 wherein the antenna comprises a means for screening background noise so improving the overall signal to noise ratio of the electric motor monitoring system.

3. (Previously presented) An electric motor monitoring system as claimed in Claim 1 wherein the antenna further comprises a frequency matching unit such that the frequency matching unit allows the antenna to be frequency tuned so as to optimize its operation with the electric motor.

4. (Currently amended) An electric motor monitoring system as claimed in Claim 3 [[4]] wherein the frequency matching unit comprises a signal conditioning unit.

5. (Previously presented) An electric motor monitoring system as claimed in Claim 1 wherein the antenna comprises a balanced Faraday screened loop antenna.

6. (Previously presented) An electric motor monitoring system as claimed in claim 1 wherein the antenna comprises an unbalanced Faraday screened loop antenna.

7. (Previously presented) An electric motor monitoring system as claimed in Claim 1 wherein the antenna comprises an electric field probe or a magnetic field probe.

8. (Currently amended) An electric motor monitoring system as claimed in Claim 1 wherein the ~~data sampling means~~ processor comprises an anti aliasing filter, an analogue to digital converter and a high speed PCI card such that the ~~data sampling means~~ processor allows the ~~high~~ radio-frequency signals, over a predetermined length of time, to be captured.

9. (Canceled)

10. (Currently amended) An antenna for measuring high frequency radio frequency signals associated with arcing events from a brush contact in an electric motor, the antenna comprising a loop and a loop screen, wherein the loop comprises a conductor and a screened coaxial cable such that the conductor is turned back on itself so as to form one or more turns while the end of the conductor cable is attached to the screen of the coaxial cable and the loop screen shields the loop from background noise thus improving the signal to noise ratio of the signal detected by the antenna.

11. (Previously presented) An antenna as claimed in Claim 10 wherein the loop screen physically covers all but a small detection section of the loop.

12. (Previously presented) An antenna as claimed in Claim 10 wherein the antenna further comprises a frequency matching unit such that the frequency matching unit allows the antenna to be frequency tuned so as to optimize the antenna's operation with the electric motor.

13. (Previously presented) An antenna as claimed in Claim 12 wherein the frequency matching unit comprises a signal conditioning unit.

14. (Canceled)

15. (Currently amended) A ~~diagnostic~~ method for monitoring ~~the operation of both mechanical and electrical components associated with~~ an electric motor, the method comprising the steps of:

i) Detecting ~~high frequency~~ radio frequency signals ~~associated with~~ generated by arcing events ~~from a brush contact with~~in the electric motor;

ii) ~~Sampling the high frequency signal over a predetermined length of time;~~

~~iii)~~ Processing the ~~sampled data~~ radio-frequency signals so as to ~~provide information regarding the mechanical and electrical components~~ determine one or more operational parameters of the electric motor.

16. (Currently amended) A ~~diagnostic~~ method ~~according to~~ as claimed in Claim 15 ~~wherein the method provides a means for~~ comprises the additional step of associating the frequency of the ~~high~~ radio frequency signal to individual components of the electric motor.

17. (Currently amended) A ~~diagnostic~~ method ~~according to~~ as claimed in Claim 15 wherein the detection of the ~~high~~ radio frequency signals employs a non-intrusive antenna.

18. (Currently amended) A ~~diagnostic~~ method ~~according to~~ as claimed in Claim 15 wherein ~~the sampling provides a means~~ for the step of processing the radio frequency signals comprises monitoring frequency modulation and amplitude modulation within the ~~high~~ radio frequency signals.

19. (Currently amended) A ~~diagnostic~~ method ~~according to~~ as claimed in Claim 15 wherein ~~the~~ processing ~~of~~ the radio frequency signals ~~sampled data~~ comprises the application of Fast Fourier Transformations so as to convert the ~~sampled data~~ radio frequency signals to interpretable frequency spectra.

20. (Currently amended) A ~~diagnostic~~ method ~~according to~~ as claimed in Claim 15 wherein the processing ~~of~~ the ~~sampled data~~ radio frequency signals comprises the application of Digital Signal Processing techniques to the sampled data so as to convert the sampled data to interpretable frequency spectra.

21. (Currently amended) A ~~diagnostic~~ method ~~according to~~ as claimed in Claim 20 wherein the Digital Signal Processing techniques comprise Wavelet Analysis.

22. (Currently amended) A ~~diagnostic~~ method ~~according to~~ as claimed in Claim 19 wherein the interpretable frequency spectra comprise frequency features that can be directly associated with ~~particular diagnostics of the mechanical or electrical components~~ one or more components of the electric motor.

23. (Currently amended) A ~~diagnostic~~ method ~~according to~~ as claimed in Claim 19 wherein the interpretable frequency spectra comprise frequency features that can be directly associated with ~~particular mechanical or electrical~~ one or more faults ~~of~~ in the electric motor.

24. (Currently amended) A ~~diagnostic~~ method ~~according to~~ as claimed in Claim 15 wherein ~~the~~ processing ~~of~~ the ~~sampled data~~ radio frequency signals comprises calculating an average width of the ~~high~~ radio frequency signals, above a predetermined level, over a number of arcing events.

25. (Currently amended) A ~~diagnostic~~ method ~~according to~~ as claimed in Claim 15 wherein ~~the~~ processing ~~of~~ the ~~sampled data~~ radio frequency signals comprises calculating an average height of the ~~high~~ radio frequency signals over a number of arcing events.

26. (Currently amended) A ~~diagnostic~~ method ~~according to~~ as claimed in Claim 15 wherein ~~the~~ processing ~~of~~ the ~~sampled data~~ radio frequency signals comprises calculating an average ratio of the width and height of the ~~high~~ radio frequency signals over a number of arcing events.

27. (Currently amended) A ~~diagnostic~~ method ~~according to~~ as claimed in Claim 15 ~~wherein the method comprises~~ comprising ~~a~~ the additional step of self-calibration of the ~~diagnostic~~ method.

28. (Currently amended) A ~~diagnostic~~ method ~~according to~~ as claimed in Claim 27 wherein the self-calibration of the ~~diagnostic~~ method comprises a current measuring technique including the sub-steps of:

i) Measuring the torque on the electric motor by employing the non-intrusive antenna;

ii) Measuring directly the current in the electric motor so as to enable the torque on the electric motor to be calculated;

iii) Taking the difference between the two methods for obtaining the value of the torque on the electric motor so providing a compensation factor; and

iv) Adding the compensation factor to the non-intrusive antenna method for measuring the torque on the electric motor.

29. (New) An electric motor monitoring system as claimed in Claim 1 wherein the processor determines the speed or torque of the electric motor.

30. (New) An electric motor monitoring system as claimed in Claim 1 wherein the processor relates the arcing events with one or more components of the electric motor.

31. (New) An electric motor monitoring system as claimed in Claim 1 wherein the processor determines a physical location within the electric motor according to the arcing events.

32. (New) An electric motor monitoring system as claimed in Claim 1 wherein the processor determines one or more faults in the electric motor.

33. (New) An electric motor monitoring system as claimed in Claim 1 wherein the processor determines variations in the operational parameters of the electric motor.

34. (New) An electric motor monitoring system as claimed in Claim 1 wherein the processor performs a fast Fourier Transform on the radio-frequency signals.

35. (New) An electric motor monitoring system as claimed in Claim 1 wherein the processor comprises a computer processor capable of manipulating and storing data corresponding to the radio-frequency signals.

36. (New) A method as claimed in Claim 15 wherein determining one or more operational parameters of the electric motor comprises determining the speed or torque of the electric motor.

37. (New) A method as claimed in Claim 15 wherein determining one or more operational parameters of the electric motor comprises relating the arcing events with one or more components of the electric motor.

38. (New) A method as claimed in Claim 15 comprises the additional step of relating the arcing events to a physical location within the electric motor.

39. (New) A method as claimed in Claim 20 comprising the additional step of determining one or more faults in the electric motor.

40. (New) A method as claimed in Claim 20 comprising the additional step of determining variations in the operational parameters of the electric motor.